DOCUMENT RESUME

ED 124 567 TM 005 286

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TITLE The Development and Empirical Validation of a Measure of Achievement Motivation.
PUB DATE 75
NOTE 28p.; Paper presented at the Annual Meeting of the American Educational Research Association (59th, Washington, D.C., March 30-April 3, 1975)

EDRS PRICE MF-$0.83 HC-$2.06 Plus Postage.
DESCRIPTORS Achievement Need; College Students; Factor Analysis; *Factor Structure; *Motivation; Self Evaluation; *Test Construction; Test Reliability; *Tests; *Test Validity

ABSTRACT

The construction of an objective, self-report, objectively-scored measure of achievement motivation is reported. Empirically keyed items were developed, reflecting empirical results found in a review of achievement motivation literature. An initial item pool consisting of 153 self-report items was administered using a matrix sampling approach to 1324 subjects in eight universities in six states. Principal components analysis and subsequent rotations resulted in the identification of 14 factors, identified as psychological dimensions of achievement motivation. Results of the study indicate that the achievement motive is not a unidimensional construct, but rather derives from other more-specific learner characteristics. Recommendations for the use of and needed research on the inventory are suggested. (Author/RC)

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The Development and Empirical Validation of a Measure of Achievement Motivation

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The education community has in recent years witnessed a renaissance of interest relating to the assessment and manipulation of the construct achievement motivation (Asbury, 1974; Atkinson & Raynor, 1974; Clark, 1973; Maehr, 1974; Maehr & Sjogren, 1971). In the assessment of human motivation, testing instruments have attempted to isolate an individual's level of achievement motivation as first defined by Murray (1938) and further developed by McClelland, et al. (1973). Various testing formats have been employed with projective techniques receiving most consistent usage. However, projective techniques, such as the Thematic Apperception Test (Murray, 1939), appear to have serious practical problems, along with having continuously failed to adequately answer the necessary questions relating to reliability, validity, and objectivity. What is evident is that although the professional community has consistently argued the need to understand and assess the construct of achievement motivation, we have not been able to do so due to our inability to measure it reliably and validly.

The intent of the study reported herein was to begin the preliminary stages of the construction of an objective, self-report measure of achievement motivation that is reliable, valid, and practical to administer in the field.

While there are a number of objective measures available, research has failed to identify any one particular instrument as good as or better than the accepted TAT. To date, the TAT and other projective measures are still being the only measures of nAch widely used. However, given the many limitations and criticisms of projective techniques, i.e., reliability, construct validity, objectivity and testability, one is compelled to consider the very real need to construct an objective, self-report device capable of assessing the many dimensions of the achievement motive construct. The need for such a device has been supported by Atkinson (1958). He has suggested that such a measure be based on the empirical findings of previous research that identifies causal factors that influence people to score high or low on nAch. He states:

> Other users of questionnaire measures of motivation have generally been unconcerned with the theoretical status of what

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> they are measuring . . . and has apparently done little substantial work on developmental variations of such self-descriptive motives in an attempt to discover how one happens to be a high or low scorer. (p. 23).

Thirteen years later, Maehr and Sjogren (1971) have repeated the Atkinson request:

> . . .designers of objective instruments have typically developed items on an a priori or theoretical basis and then determined the validity of the instrument on the basis of correlations with standard projective measures or designed achievement behavior. A more appropriate tactic may be to build a scale empirically... selecting items that differentiate between people who perform a task with high achievement motivation (p. 149).

No objective measure to date has been developed using empirically identified determinants of achievement motive behavior as the basis for item construction.

Methodology

As the first step toward the construction of an objective, self-report measure of achievement motivation, over 250 professional and scientific journal articles were reviewed for research investigating the behavioral and attitudinal differences between subjects with high and low achievement motivation. A pool of forced-choice stimulus items was constructed to reflect the results of those empirical studies whose findings differentiated among subjects with high or low achievement motivation. For example, Winterbottom (1958) found that subjects with high need for achievement will generally take a short break after successfully completing a task. Subjects with low achievement motivation do not appear to take this break. A test item was subsequently constructed to reflect this finding:

> After a successful completion of a task, I will usually take a break before continuing onto something else.

The empirical literature review resulted in 153 self-report items. These items were grouped into eight categorical headings identified consistently in the review. The eight headings derived included: perseverance, success probability, personal characteristics, parental attributes, sex differences, choice behavior, reaction to success/failure, and accomplishments. The methodology followed up to this point was planned to permit the greatest degree of content validity for each item as it related to the achievement motive construct. In effect, this methodology for item construction can be identified as empirical keying (Cronbach, 1972).

Each stimulus item was then written in a forced-choice format following the pattern of a Likert-type scale. For example:

I seldom ask for someone's advice while I am working on a problem.

1. strongly agree
2. agree
3. disagree
4. strongly disagree

Items were developed, field tested, and edited as necessary to be appropriate for college level and above reading comprehension.

An item-sampling methodology was adopted in the construction of the preliminary questionnaire. It became necessary to construct a device which could be administered within a 50-minute class period, it was decided to break the 153 items into three forms of 102 items each.

With this arrangement all of the items were responded to (not by the same individual) and all respondents would have sufficient time to finish within an average class period. The data which was collected by this item-sampling approach was summarized so that all moments of the sample distribution on all items could be estimated (Bunda, 1973; Lord, 1962). In addition to the achievement motive items, each questionnaire included 13 demographic questions which were to be answered prior to responding to the 102 items of a given form.

The preliminary test forms were administered under supervision to 1324 subjects found in eight university/college populations across six states. The sample was approximately equally split between males and females, and included college freshmen through graduate students.

Data Analysis

Principal components analysis was used to initiate an investigation of the dimensionality of the 153 empirically keyed items. The scree test was then used to determine the salient dimensions extracted from the components analysis. This procedure indicated that 17 to 15 factors appeared relevant, and thus normalized varimax rotations were computed for rotations of 17, 16 and 15 factors. An oblique rotation solution was not performed due to a lack of sufficient computer software, however, such an investigation is called for by the study.

On the basis of the three orthogonal rotations, items were eliminated from the original set of 153. Elimination was contingent on the item's failure to load on any factor (loadings less than $\pm$ .25). A second components analysis

was conducted on the cast-off 55 items to safeguard against the possible exclusion of a salient factor(s). A factor of eight items was identified from this follow-up analysis, setting up the final components analysis on 106 of the original 153 items. The components analysis on the remaining 106 items indicated 15 viable dimensions accounting for 44 percent of the original variance. These 15 factors were then subjected to a normalized varimax procedure for rotation to simple structure.

Results

Investigation of the first factor extracted from the principal components analysis of the final 106 items revealed 28 items with unrotated factor loadings greater than $\pm.35$ contributing to a general "g" factor of achievement motivation. These items and their respective unrotated loadings are presented in Appendix B. We would point to these items as a measure of the overall construct of achievement motivation at this time.

A normalized varimax rotation of the 15 factors identified by the components analysis further clarifies the dimensionality of the 106 items. Of the 15 orthogonally rotated factors, 14 were logically explained as psychological constructs of achievement motivation as previously identified in the review of the literature. The 14 factors in order to contribution were: perseverance, task orientation, parental affection, test taking behavior, competitiveness, reaction to success/failure, social acceptance, independence, involvement, fear of failure, rigidity, anticipatory behavior, future orientation, and parental restriction. Factors and their respective items are presented in Appendix A. Table 1 identifies eigenvalues and percent of variance accounted for by each factor. A description of each factor follows.

Factor 1: Task Orientation (Items: 1, 3, 12, 22, 65, 74, 75, 76, 79, 81, 90, 97, 101, 105)

The factor identified as task orientation is measured by 14 items which account for 9.1 percent of the variance in the factor structure. The central theme of this factor focuses on the question, "If given a choice of activities, what kind of activity or task would you choose?" The review of literature reflected a consistent pattern of subject response of this rhetorical question dependent upon the level of nAch possessed by the subject. A general pattern of response identified in the review of literature by McClelland (1958) and Atkinson (1950) indicated that high nAch'ers will choose tasks of moderate

Table 1

Eigenvalues and Percentages of Explained Variance for Each of the 15 Rotated Factors Extracted by the Components Analysis on the Final 106 Items

Factor	Eigenvalue	Percent of Explained Variance
1 - Task Orientation	3.920	9.04
2 - Perserverance	2.440	5.63
3 - Parental Affection	3.509	8.09
4 - Fear of Failure	3.236	7.46
5 - Social Acceptance	3.220	7.43
6 - Reaction to Success/Failure	3.135	7.23
7 - Future Orientation	4.212	9.71
8 - Involvement	2.776	6.40
9 - Parental Restriction	3.428	7.91
10 - Test-Taking Behavior	2.408	5.55
11 - Competitiveness	2.051	4.73
12 - Independence	2.218	5.11
13 - Rigidity	2.305	5.32
14 - Unidentified	2.040	4.70
15 - Anticipatory Behavior	2.463	5.68
Total		43.36

difficulty where they have approximately a 50/50 chance of success and failure, and low nAch'ers will typically choose either very difficult or very easy tasks. Subsequently, those subjects scoring low on this scale's factor choose activities selected by high nAch'ers and those subjects scoring high on this factor choose similar activities with those subjects of low nAch. The 14 items are identified in Appendix A, along with their associated loadings.

Factor 2: Perserverance (Items: 8, 44, 48, 50, 58, 61, 96, 100)

The second factor extracted from the components analysis is comprised of eight items accounting for 5.7 percent of the variance in the factor structure.

The factor is identified as perserverance due to the consistent pattern of content found in the items. The items grouped on this factor reflect the persistence or determination of the subject to finish or complete tasks, problems, challenges, etc. The factor attempts to show the pattern of behavior that subjects undergo after work or effort has been initiated on some task.

Studies by Atkinson & Litwin (1960) and Winterbottom (1958) have demonstrated an apparent difference in behavior between subjects of high and low nAch. It appears, that subjects with high nAch, as opposed to subjects with low nAch tend to work longer on problems or tasks but realize their limits sooner and will subsequently give up on fruitless efforts. The level of achievement motivation that an individual possesses appears to be related to the behavior of the individual in the area of task perserverance. Consequently, a person scoring low on this factor tends to work on problems longer but will also concede when the task appears hopeless.

Factor 3: Parental Affection (Items: 14, 19, 21, 40, 45, 46, 69, 72, 82, 94)

Ten items comprised the third factor identified as parental affection (8.1 percent of the variance accounted for). Following the theme of empirical results found in the review of literature established by Winterbottom (1953) and McClelland et al. (1953), the central pattern of the item's content in this factor focuses on the subject's recollections and judgments of his childhood interaction with his parents. The review reports a consistent difference in subject response depending on their level of achievement motivation. It appears that subjects high in need for achievement view their parents as less friendly and warm than do subjects with low nAch. In the judgment of the subject, the degree of parental warmth or lack of warmth is indicated by this factor with a high factor score showing the lack of such.

Factor 4: Fear of Failure (Items: 11, 15, 16, 26, 28, 39, 43, 47, 64, 103)

Fear of failure is the heading attributed to the fourth factor. The factor is comprised of ten items which reflected those elements of self-doubt or uncertainty in the subject. The factor grouped those items which appeared to cause the subject to question their ability or knowledge. These ten items seem to raise dissonance in the subjects in regards to their self-concept.

The dimension of fear of failure appears consistently in achievement motivation literature (Heckhausen, 1967; McClelland, 1961). Basically, the theme of this dimension is one of motivation. As reported in the literature

review, subjects with low nAch are motivated more by the fear of failing at something than they are motivated by the possible outcomes of success. The opposite is true for subjects with high nAch. Consequently, the factor is comprised of items reflecting the motivational orientation of the subject, with a high score reflecting fear of failure in the subject.

Factor 5: Social Acceptance (Items: 10, 37, 71, 73, 78, 85, 88, 89, 99)

Factor five was identified as social acceptance and reflects the social needs of the respondent. The nine items isolated by this factor key on the subject's expressed concern over his "social self." The factor clearly dichotomizes between external or social success and internal of self-fulfillment. This dimension further asks the subject to differentiate his behavior in regards to his social or self-motivation. The factor reflects a consistent set of research findings indicating that subjects with high need for achievement tend to be internally motivated with little concern over social needs or consequence. A low score on this factor would indicate that the subject is more internally motivated than socially motivated and succeeds at tasks more for personal success than social popularity or praise.

Factor 6: Reaction to Success/Failure (Items: 32, 41, 83, 91, 98, 102, 106)

The sixth extracted factor is comprised of seven items and is identified as reaction to success/failure. As is indicated by this heading, the factor's concern is with the subject's behavior immediately following successful or unsuccessful completion of a task or problem. The seven items inquire into the behavior and reactions of the subject following these two possible antecedent events.

As indicated by Feather (1962) and Moulton (1965), subjects with high need for achievement react differently to success or failure than do subjects with low nAch. For example, subjects with high nAch will generally attempt more difficult problems after success and less difficult ones following failure, whereas the reverse is typical for subjects with low nAch (McClelland, 1958). Also, high nAch subjects tend to take short breaks in work after successful completion of one state (Weiner, 1966). Scoring low on this factor indicates that the subject reacts in the same manner as do those subjects with high levels of achievement motivation.

Factor 7: Future Orientation (Items: 6, 38, 59, 63, 70, 77, 80)

The seventh factor is identified as future orientation. Following the pattern of results by Green & Knapp (1959), and Ricks & Epley (1960), this factor reflects the temporal attitude or orientation of the subject. The literature has grouped a number of studies reflecting differences between high and low need achievers on such a dimension. Consistently, subjects with high nAch tend to be more future oriented and more concerned with the passing of time than do subjects low in nAch. Consequently, a low score on this scale reflects the future orientation of the subject differentiating him from those subjects low in nAch.

Factor 8: Involvement (Items: 2, 20, 29, 30, 52, 53, 93)

The eighth factor is identified as involvement and is comprised of seven items. The seven items grouped by this factor reflect the committment or involvement of the subject to activities or tasks. The factor revolves around the element of subject participation in what ever they attempt. Items investigate the extent and breadth of subject participation. Achievement motivation literature reports that subjects with high nAch tend to get more actively involved in most tasks than do subjects with low nAch (McClelland, 1955). The extent, breadth and depth of participation are greater for subjects with high nAch (French & Thomas, 1958). Consequently, a low scorer on this factor reflects greater participation and involvement activity than does a high scorer.

Factor 9: Parental Restriction (Items: 25, 33, 60, 66, 104)

The ninth factor extracted by the analysis has been identified as parental restriction. In contrast to the third factor's attempt to assess subject's judgments of parental affection, the ninth factor indicates the subjects judgments of the amount of childhood and adolescent restriction placed on him by his parents or guardians. The review of literature demonstrated a pattern of response which indicated that high nAch'ers saw their parents as having expected a lot of them when younger, but also failing to place unnecessary restrictions upon them (Winterbottom, 1953). Subsequently, subjects with high need for achievement reported a very free and unrestrictive childhood. The opposite is true for subjects with low nAch (McClelland et al. 1953; Rosen & D'Andrade, 1959). The five items of this factor present statements of parental restrictiveness attempting to appraise subject attitude towards the rearing habits of his parents. A low score on this factor reflects a unrestricted or free childhood as perceived by the individual.

Factor 10: Test-Taking Behavior (Items: 5, 27, 35)

The tenth factor extracted from the analysis is identified as test-taking behavior. The three items comprising this factor reflect the subject's behavior during testing conditions. The factor focuses on the temporal aspects of testing behavior. Research by French & Thomas (1958 and Atkinson (1950) has shown that subjects with high need for achievement will take more time on problem solving tasks or school tests than subjects with low need for achievement. A low score on this factor would indicate that the individual is often the last person to complete a test subsequently taking more testing time than others.

Factor 11: Competitiveness (Items: 7, 9, 23, 24, 87, 92)

The eleventh factor is idnetified as competitiveness. The six items which comprise this factor refer to the level or extent of the need for competition as expressed by the subject. The factor centralizes on conditions or activities of competition that are preferred by the subject (i.e., I enjoy competing against the clock). The review of literature cited much of McClelland's work (1961) which demonstrated that subjects with high levels of nAch also have high levels of need for competition. A low score on this factor reflects a high need for competition.

Factor 12: Independence (Items: 4, 34, 57, 68, 86)

The twelfth factor is identified as independence. The factor's content indicates the subject's orientation to working or performing alone or in groups. Whereas, factor 13 identifies the level of flexibility needed by the high nAch'er in regards to rules, regulations or limitations, factor 12 attempts an inquiry into the social orientation of the subject while he is actively working on a task. Achievement motivation literature reports a greater preference for working alone, independently, among subjects with high nAch than among low nAch'ers (French, 1955; Wertham & Mednick, 1958). Consequently, a low score on this factor reflects a high preference for working alone or one could say for independence.

Factor 13: Rigidity (Items: 17, 18, 5[illegible], 55, 56)

Rigidity is the heading of the thirteenth contributing factor. The item content of the factor indicates the flexibility or rigidity of the subject in relation to specific life circumstances. The factor's six items inquire into the subject's needs for the security provided by consistency or stability. Subjects with high need for achievement appear in the literature to be more flexible

and adventurous in life's activities than do subjects with low nAch (Atkinson, 1958; McClelland, 1961). The literature also reports a concerned need for flexibility possessed by high nAch'ers (Atkinson & Raphelson, 1956). A low scorer on this factor reflects this need for flexibility and high adventurous behavior.

Factor 14: Unidentified (Items: 36, 42, 84)

The construct of the fourteenth factor could not be psychologically explained. The content of the three items which comprised the factor did not demonstrate any perceivable pattern. One explanation considered is that the factor could be a collection of those items demonstrating total uniqueness from all others and subsequently grouped together merely due to their individual uniqueness. However, at this time no interpretation as to how this factor relates to nAch has been attempted.

Factor 15: Anticipatory Behavior (Items: 62, 95)

The two items have structured the fifteenth factor as anticipatory behavior. In contrast to factor 7, this factor inquires into the behavior of the subject in preparation for something in the future as opposed to the temporal attitude of the future-oriented subject. Green & Knapp (1959) and Lewin (1951) were reported in the literature review as assessing high amounts of active participation in future oriented activities in high nAch'ers. A low score on this factor reflects this high amount of anticipatory behavior in the subject. The drawback to the factor is the small number of items that make up the factor. However, the pattern of content is quite evident and thus suggesting the need to develop additional items to assess this dimension.

Reliability

Coefficients of stability and internal consistency were estimated for each of the 14 defined factors. Stability was computed over a six week period on 92 subjects. Internal consistency was computed for 152 subjects using Cronbach's alpha. The obtained coefficients are reported in Table 2.

A rationale for the few low stability coefficients would include the limited number of items on some of the factors as well as the length of time between testing being too great due to the limited number of items.

While some of the coefficients of internal consistency appear weak, due to the methodology employed to derive the factors, this result shoudl be anticipated (Cattell, 1959).

Table 2

Stability and Internal Consistency Coefficients
for Each of the 15 Factors

Factor	Stability Coefficient	Internal Consistency
1. Task Orientation	.578	.745
2. Perserverance	.316	.727
3. Parental Affection	.641	.562
4. Fear of Failure	.674	.531
5. Social Acceptance	.752	.699
6. Reaction to Success/Failure	.540	.588
7. Future Orientation	.744	.735
8. Involvement	.802	.540
9. Parental Restriction	.623	.560
10. Test-Taking Behavior	.844	.670
11. Competitiveness	.430	.356
12. Independence	.719	.526
13. Rigidity	.560	.400
14. Unidentified	.671	.475
15. Anticipatory Behavior	.711	.524

Conclusions

Results of this investigation pointed to the finding that achievement motivation is not, as it is often defined, a unidimensional construct. Rather, it would appear to be a derivative of a set of other more specific traits of the learner which in concert blend to define a level of achievement motivation. The relevance, or more precisely the validity, of the 14 factors which were found are supported in the research literature as being related to or components of achievement motivation.

Also important to note is the individual character of the factors identified. As a group they relate not solely to the way in which the learner perceives himself, but dimensions were identified relating to how the learner

sees himself being affected by the behavior of others, most notabily parents or guardians. It would appear, based on these findings, that we cannot simply choose to direct efforts at altering something called achievement motivation in a general sense, but rather, manipulation must consider more individual traits of the learner, which when viewed in toto result in changes in achievement motivation behavior.

It should be clear that this study is only a preliminary step in the development of a valid and reliable achievement motivation index. To produce such an index from the results of this study future work should include the addition of new items to each identified factor-dimension, re-administration and analysis of the extended index, validation and cross validation of the extended index with the emphasis on both concurrent and construct validation, and the development of norms.

While this investigation has not provided a finalized instrument, it is believed that this preliminary investigation has supplied a solid foundation for the future establishment of such a finished product. The instrument developed can be a useful tool in the assessment of learner's motivational attitudes, as well as serving as an effective research device. Also, the developed instrument does not require the training and sophistication previously needed to assess achievement motivation using the TAT, and can easily be administered within a time period of 30-40 minutes.

A more complete description and presentation of this research paper may be obtained by writing to the authors.

Appendix A

Final 106 Items and Associated Factor Loadings

Item #	Factor	Factor Loading	Item
1	1	.470	I am highly motivated when I know that a task is difficult.
2	8	-.717	I am physically more active than most people.
3	1	-.516	I often choose moderately difficult tasks rather than very difficult ones.
4	12	.662	I prefer to work alone.
5	10	.579	I have found myself short of time on a test because I spent too much time on one or two problems.
6	7	.443	I often find myself speaking in the future tense.
7	11	.310	Successful completion is the primary goal of any undertaking.
8	2	.383	I will often keep working at something even if it seems hopeless.
9	11	.433	I would rather work on a commission basis with a chance for a large income than work on a fixed salary with a lower, but steady income.
10	5	.391	I am motivated more by social pressures than by personal needs.
11	4	.382	I find it easier to make decisions after getting someone's advice.
12	1	-.362	I would rather take a multiple-choice test than an essay exam.
13	Failed to load		Quite often I will work extremely hard at a task because I am afraid of failing at it.
14	3	-.702	My parents (guardians) were seldom affectionate with me.
15	4	.607	I often feel at peace with myself.
16	4	-.381	I believe that I succeed at tasks more times than I fail.

17	13	.313	If I were a teacher, I would rather have good students, than freedom and flexibility in the job.
18	13	.538	I would rather have the teacher set the deadlines than set them myself.
19	3	.400	My parents (guardians) seldom discouraged me from doing new things as I grew up.
20	8	.556	I prefer games of skill to games of chance.
21	3	-.576	I view my parents' (guardians') lives as unproductive.
22	1	.516	Getting an "A" in a course is always possible for me.
23	11	.380	I would rather work for a company that pays well, than work for a company that pays less but affords job flexibility.
24	11	.506	I can accomplish simple manual tasks faster than most people.
25	9	-.723	I feel that my parents (guardians) were very restrictive in raising me.
26	4	.429	I become frustrated easily.
27	10	.788	I am often the last person to finish a test.
28	4	-.494	I am usually realistic about my goals and aspirations.
29	8	.362	I feel that I am more likely to succeed at any given task than are most people.
30	8	-.662	I prefer to watch sports on television, rather than participating myself.
31	Failed to load		I am unhappier about doing something badly, than I am happy about doing something well.
32	6	.405	After a considerable amount of time on a problem, I prefer to move on to an easier one.
33	9	.415	My parents (guardians) allowed me to make my own friends.
34	12	-.626	I prefer to work on difficult projects with someone, rather than trying them alone.
35	10	-.725	I am (was) frequently the first person done with a test.

36	14	.386	I prefer independent study programs to traditional lecture classes.
37	5	.465	Being popular is more important than just being successful.
38	7	.505	I am not as much concerned about the present as I am about the future.
39	4	-.398	I have courage.
40	3	.376	I have often followed my parents' (guardians') advice even when I disagreed with it.
41	6	.537	I feel as though I can take short breaks after successfully completing one stage of a large project.
42	14	.608	While working on a project, I often get side-tracked by new ideas.
43	4	-.375	I feel that I am being very realistic with my career choice in relation to my ability.
44	2	.570	I like to live by the saying, "Never give up."
45	3	.547	My parents are (were) friendly.
46	3	-.686	I always lacked closeness with my parents (guardinas).
47	4	.403	Often I am disappointed in my ability to interact with others.
48	2	.627	I dislike giving up on a task.
49	Failed to load		I am motivated more by the fear of failing than by the anticipation of possible success.
50	2	.357	I consider myself open to new ideas or beliefs.
51	Failed to load		Time is unimportant as long as I solve the problem correctly.
52	8	.411	When the odds are against me in games of skill, I am highly motivated to do my best.
53	8	.408	In school, I am (was) active in extra-curricular activities.
54	13	.310	I would rather change my opinion than disagree with the consensus of the group.
55	13	.460	A true challenge is one that is practically impossible to accomplish.

56	13	.460	It is more important to have friendly co-workers than flexibility in the job.
57	12	-.334	I enjoy(ed) classes in school with a mixture of students with varying ability.
58	2	.602	Unfinished tasks bother me until I get a chance to finish them.
59	7	.583	I consider myself vary conscious of time.
60	9	-.493	My father (male guardian, is (was) very dominating and strict.
61	2	-.376	If I cannot solve a particular problem, I would rather try an easier one than keep working on the harder task.
62	15	.454	I will often spend days just thinking and organizing before beginning the work of a project.
63	7	.545	I frequently find myself doing something now, in preparation for the future.
64	4	.543	Other people influence my opinions more than I would like them to.
65	1	-.512	I enjoy completing many easy tasks rather than just a few difficult ones.
66	9	-.448	My parents (guardians) expected a lot from me when I was young.
67	Failed to load		I am a very poor gambler in games of chance.
68	12	.355	I seldom ask for someone's help while I am working on a problem.
69	3	-.485	My parents (guardians) never seemed very confident of their own abilities.
70	7	.450	It is important to have long range goals clearly in mind.
71	5	.507	Monetary rewards are the best way to motivate me to do my best.
72	3	.376	I would often work very hard at something just for my parents' (guardians') approval.
73	5	.540	One cannot be truly successful if he/she is not also popular.
74	1	.403	I will frequently make a very easy task more difficult to make it more interesting.
75	1	-.426	Certain careers are too difficult for me to pursue.

76	1	.518	Very difficult problems are more motivating than moderately difficult problems.
77	7	.539	Generally, I feel compelled to know the exact time.
78	5	-.300	I do not mind putting in extra hours and work if it helps me finish a task
79	1	.410	In school, I have usually taken advantage of independent study options.
80	7	.556	I generally aim my activities toward a future goal.
81	1	.344	I prefer a well written book to a good movie.
82	3	.301	When younger, I felt very guilty when I disobeyed my parents (guardians).
83	6	.508	I will work longer on problems I believe I can solve, than on those I consider close to impossible.
84	14	.477	I will often do things for the present enjoyment and not be concerned with future consequences.
85	5	.681	Social recognition is the primary goal of any undertaking.
86	12	-.505	Tasks are performed best through group efforts rather than through individual effort.
87	11	-.385	Games are not much fun if the competition is too strong.
88	5	.313	It is often too much trouble to disagree with a group opinion.
89	5	.638	Social acceptance is more important than personal success.
90	1	.383	I would rather fail at a difficult task than succeed at an almost effortless task.
91	6	.312	I will often do my best in order to avoid the embarrassment of failure.
92	11	.442	I enjoy competing against the clock.
93	8	.418	After participating in athletics, I find it much easier to accept defeat if I have played well.
94	3	.620	My parents (guardians) rewarded me with a hug or a similar show of affection for doing something well.

95	15	.543	I often pack my suitcase days before I am ready to leave.
96	2	.362	Success encourages me to attempt even more difficult problems.
97	1	.384	I feel that I can succeed at almost anything I try.
98	6	.420	I enjoy being in groups with people of equal ability.
99	5	-.425	I would rather be unpopular with my own opinions than be popular with someone else's opinions.
100	2	.618	It is important to finish something once it is started.
101	1	.403	I enjoy trying to solve problems some people would consider impossible.
102	6	.610	After successfully completing a task, I like to relax for a short period before attempting something new.
103	4	-.348	I consider myself an independent thinker.
104	9	.614	My parents (guardians) gave me considerable independence early in life.
105	1	.434	I will often attempt a difficult problem after failing at an easier one.
106	6	.399	I realize the limits of my own ability and knowledge.

Appendix B

28 nAch 'G-Factor' Items and Associated Unrotated Factor Loadings

Item #	Unrotated G-Loading
97	.575
1	.550
101	.515
103	.510
96	.501
16	.492
44	.470
52	.452
80	.449
39	.440
48	.431
100	.427
78	.408
76	.405
61	-.405
28	.398
58	.396
63	.388
50	.386
43	.382
22	.378
70	.373
65	-.367
15	.362
29	.362
90	.360
8	.360
104	.349

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THE EMPIRICAL DEVELOPMENT OF A MEASURE OF ACHIEVEMENT MOTIVATION

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ABSTRACT:

This study reports the construction of an objective, self-report, objectively-scored measure of achievement motivation. Empirically keyed items were developed, reflecting empirical results found in a review of achievement motivation literature. An initial item pool consisting of 153 self-report items was administered using a matrix sampling approach to 1324 subjects in eight universities in six states. Principal components analysis and subsequent rotations resulted in the identification of 14 factors, identified as psychological dimensions of achievement motivation. Results of the study indicate that the achievement motive is not a unidimensional construct, but rather derives from other more-specific learner characteristics. Recommendations for the use of and needed research on the inventory are suggested.

The education community has in recent years witnessed a renaissance of interest relating to the assessment and manipulation of the construct achievement motivation (Asbury, 1974; Atkinson & Raynor, 1974; Clark, 1973; Maehr, 1974; Maehr & Sjogren, 1971). In the assessment of human motivation, testing instruments have attempted to isolate the individual's level of achievement motivation as first defined by Murray (1938) and further developed by McClelland, Atkinson, Clark, and Lowell (1953). A variety of testing formats have been

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*The authors wish to gratefully acknowledge the comments and assistance of Drs. Neil Salkind and Donald Treffinger in the early stages of the development of the inventory.

employed, with projective techniques receiving the most consistent use. However, projective techniques, such as the Thematic Apperception Test (Murray, 1938), appear to have serious practical problems, and have failed to provide adequate data on reliability, validity, and objectivity. What has become evident is that, although educational psychologists have consistently argued the need to understand and work with the construct of achievement motivation, we have not been able to do so due to our inability to measure it reliably and validly. The intent of the study reported herein was to construct an objective, self-report measure of achievement motivation that is reliable, valid and practical to administer in the field.

METHODS

As a first step toward accomplishing this task, empirical keying was undertaken to create a pool of stimulus items based on the construct of achievement motivation. Over 260 research studies were reviewed from which stimulus based items were constructed to reflect empirical results that differentiated subjects with high or low achievement motivation. Each item in this original pool was then reviewed and field tested to assess its readability, ambiguity, and redundancy.

This content review resulted in 153 self-report items. Items were constructed to reflect the empirical restuls found in the review of the literature, and were grouped in definable categories identified consistently by the review. The eight headings derived included: perseverance, success probability, personal characteristics, parental behavior, sex differences, choice behavior, reaction to success-failure, and accomplishments. The procedures followed up to this point were planned to enhance the content validity for each item, as it related to the achievement motivation construct.

Inventory items were written in forced-choice form, following the pattern of a Likert-type format with four response alternatives.

Using multiple matrix sampling, three forms of an inventory were prepared, each form containing 102 items and each item from the original pool appearing on two of the three forms constructed. Inventory forms were adminstered, under supervision, to 1324 subjects found in eight university/college populations in six states. The sample was approximately equally split between males and females, and included college freshmen through graduate students.

Principal components analysis was used to initiate an investigation of the dimensionality of the 153 items. The scree test was used to determine the number of salient dimensions extracted from this analysis. This procedure indicated that 15 to 17 factors appeared to account for substantial non-error variance, so normalized varimax rotations were computed for 17, 16, and 15 factors.

On the basis of these three rotations, 55 items were eliminated from the original set of 153. Elimination was contingent on an item's failure to load on any factor (loadings less than ±.25). A second components analysis, including rotations, was conducted in the cast-off 55 items to safeguard against the possible exclusion of a salient factor(s). A factor of eight items was identified from this follow-up analysis, leading to a final components analysis on 106 of the original 153 items.

The components analysis on the resultant 106 items indicated 15 viable dimensions accounting for 44 percent of the original variance. These 15 factors were then subjected to a normalized varimax procedure for rotation to simple structure.

RESULTS

Investigation of the first factor extracted from the principal components analysis of the final 106 items revealed 28 items with factor loadings greater than ±.35; this factor was thus termed a general "g" factor of achievement motivation.

The normalized varimax rotation of the 15 factors identified by the components analysis further clarifies the dimensionality of the 106 items. Of the 15 orthogonally rotated factors, 14 were defined as psychological components of achievement motivation. The 14 factors in order of contribution were termed: perseverance, task orientation, parental affection, test taking behavior, competitiveness, reaction to success/failure, social acceptance, independence, involvement, fear of failure, rigidity, anticipatory behavior, future orientation, and parental restriction.

Following the components analysis the 106 items were cast onto a new inventory form to determine coefficients of stability and internal consistency for each of the 14 factors identified. This form was administered to 152 previously-untested undergraduate and graduate students at two universities. Computed stability coefficients for a six week interval ranged between .38 and .85. Internal consistency coefficients (Cronbach's α), based on the first administration of the inventory to these subjects, ranged from .36 to .75. Low indices of reliability were typically found for those factors composed of relatively few items.

CONCLUSIONS

Results of this investigation point to the finding that achievement motivation is not, as it is often considered, a unidimensional construct. Rather, it would appear to be a derivative of a set of other more-specific traits of the learner which, in concert, blend to define a level of achievement motivation. The relevance, or more precisely the validity, of the 14 factors which were found are supported in the research literature as being related to, or components of, achievement motivation.

It is also important to note the character of the factors identified. As a group they do not relate solely to the way in which the learner perceives

hirself. Dimensions identified also related to how the learner sees hirself being affected by the behavior of others, most notably parents or guardians. It would appear, based on these findings, that we cannot simply choose to direct efforts at altering something called achievement motivation, but rather manipulation must consider more-individual traits of the learner, which, when viewed together, result in changes in achievement motivation behavior.

It should be clear that this study is only a preliminary step in the development of a valid and reliable achievement motivation index. To produce such an index from the efforts of this investigation, future work should include the addition of new items to each identified factor-dimension, re-administration and analysis of the extended inventory, validation and cross-validation of the extended inventory with emphasis on both concurrent and construct validation, and the development of norms.

While efforts to date have not provided a final instrument, it is believed that this preliminary investigation has supplied a solid foundation for the future establishment of such a finished product. The instrument developed can be a useful tool in the assessment of learners' motivational attitudes, as well as serving as an effective research device.

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